

Predicting Sustainable Lifestyle Behaviors:  
A Comparison Against Environmental Behaviors.

Honors Research Thesis

Presented in Partial Fulfillment of the Requirements for the Honors Degree of  
Environmental Policy and Management in the Undergraduate School of Environment and  
Natural Resources of The Ohio State University

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Undergraduate Honors Program in Environmental Policy and Management

The Ohio State University

2013

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## Abstract

Owing to empirical data from Environmental Psychology and Environmental Policymaking, measures such as political ideology, worldview, age, gender and income are commonly used to predict environmental behavior. The purpose of this research will be to find relationships between these measures and survey correspondents' self-reported likelihood to engage in sustainable lifestyle behaviors. Motivations for engagement in sustainable lifestyle behaviors are often different than those for engagement in environmental behavior, meriting a case for separate research. For how salient sustainability has become in the 21<sup>st</sup> century, it is surprising how little empirical research there is to link sustainability with the previous research in other fields. The findings of this research are then compared against the previous studies on environmental behavior. The results of this research show that ones' political ideology, worldviews, and other measures *can* be used to predict sustainable lifestyle behaviors in a way that parallels environmental behavior. However, as hypothesized, the link between the two types of behaviors is not perfect. In practice, these findings will hopefully lay the foundations for interdisciplinary discussion and research on the topic of sustainable behaviors.

## Acknowledgments

I am indebted to all of the great professors and faculty who helped me over the years here at The Ohio State University. As well, I thank Ajay Sing for his patient assistance and for his access to his survey, and Adam Zwickle for the access to his questions on Ajay's survey.

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## Introduction

### Another Environmental Study?

Over the last century, our climate has been changing (1). Precipitation patterns have been altered, the sea has been rising, and according to projected growth, climate models predict that the US average temperature will increase by five to nine degrees Fahrenheit within the next one hundred years (1,2). The possible effects of this changing climate range from problems such as ecosystem harm, including the loss of biodiversity, to an increased rate of global disease, to global economic disruption (1,3).

These problems have often been listed as key motivators for psychologists, economists, and policymakers alike to study behaviors that affect the environment. Knowledge on this climate dilemma is sometimes enough to inspire pro-environmental behavior. If one has had experience with previous behavioral research studies, one may logically guess this paper will follow the trend and will attempt to learn about behavior in some effort to help promote pro-environmental actions. However, this is not the case. However compelling information on climate change may be, the environment is not the focus of this research.

This research is on sustainable lifestyle behavior. Specifically, this study will utilize predictive measures that have previously been studied in reference to environmental behavior, will correlate these measures with the respondent's self-reported likelihood of

participation in sustainable lifestyle behavior, and will then contrast the findings of this study against the studies focused on environmental behavior.

### What is Sustainability?

Classical rhetoric on sustainability states that sustainable development is “development which meets the needs of the present without compromising the ability of future generations to meet their own needs (4).” More contemporary terminology typically employs the Triple Bottom Line approach when detailing Sustainability (5, 6, 13, 95, 96, 101-107). As seen in the figure below, sustainability, which is in the center of the three spheres, encompasses actions that benefit the Economy, Society, *and* the Environment.

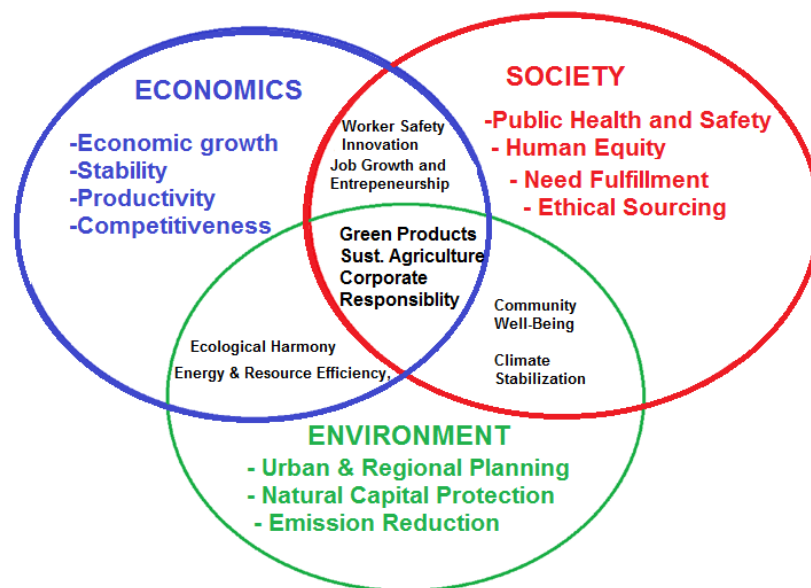


Figure 1: The Tripple Bottom Line Author made, based off of Hecht et al. (5)

While research on environmental behavior typically targets actions that specifically affect the “Environment” sphere of the Triple Bottom Line, a sustainable lifestyle behavior affects all three levels. Even if the sustainable behavior influences the environment, the environmental benefit could be an aftereffect, opposed to a motivation. Just as it is with other behaviors, sustainable behaviors can be described as physical actions, motivated by a series of beliefs, values, norms, attitudes, risk perceptions, and more. Such concepts will be described in detail further on in the study.

#### Why is Sustainability important?

Because of how salient the topic of sustainability has become, research on sustainability has come to be extremely relevant. As said by Dyllick et al. in 2002, “Sustainability has become a mantra for the 21<sup>st</sup> century. It embodies the promise of societal evolution towards a more equitable and wealthy world in which the natural environment and our cultural achievements are preserved for generations to come (6).” The standard of operation in businesses, consumers, NGOs, governmental organizations, and industry alike has been changing, as a result of sustainability (5).

In the governmental sector, for example, rhetoric on Sustainability has been included in documents as recent as the 2013 President’s Climate Action Plan (7). However, this is no new topic. Political discussions dating past even 1970s include topics that pertain to sustainability. In 1979, it was argued that “If the United States were to make a serious

commitment to conservation, it might well consume 30 to 40 percent less energy than it does, and still enjoy the same or even higher standard of living (8).” As seen in Appendix A, billions of governmental dollars are being funneled to programs that promote efficiency and sustainability (9).

In the residential sector, for example, the rise of demand for super energy-efficient technology may indicate increased participation in sustainable lifestyle behaviors (10). In a study by Lowes in 2006, it was found that nine out of ten builders responded to this demand by incorporating energy-saving features into the construction of new homes (11).

The importance of research on behavioral intentions linking to sustainable lifestyles can be linked to the value it brings to the society as a whole. Through the gradual adaption of sustainable lifestyle practices, society can save money and reduce the negative effects of energy consumption (9). True, depending on the specific behavior, sustainability is not always right for some (12, 13, 14) and is not without criticism (12, 15, 16, 17). However, as demonstrated in the paragraphs above, the importance of sustainability is logical and initiatives towards researching this concept are justifiable.

#### How Does This Study Differ?

Knowledge on climate change may be one of many influences on a person that could lead to involvement in a sustainable lifestyle behavior. However, the environmental factor cannot and should not be considered the prime factor used to explain sustainable



behaviors. Environmental behaviors and sustainable lifestyle behaviors are different. While sustainable actions often enhance the environment, society, and economy, environmental behaviors are always linked directly to the environment without the other factors directly in consideration. When the environment is the only focus, scenarios may arise where an environmental behavior may benefit the environment but hurt ones' finance at the same time. Such actions are not sustainable. Most sustainable behaviors are pro-environmental, but not all pro-environmental behaviors are sustainable. These differences merit logic for new research specifically pertaining specifically to sustainable lifestyle behaviors.

The environment is the core subject matter in the fields of Environmental Psychology and Environmental Policymaking. However, because of the problems noted above, researchers studying sustainability can only partially apply the findings of those fields. Again, as indicated previously, peoples' knowledge and beliefs on the environment are only partial explanatory components of sustainable lifestyle behaviors. The two topics, though linked, are different. If researchers in the field of sustainability mirror the studies of Environmental Psychology and Environmental Policymaking, they findings will likely discover results to be similar yet unique.

Studies in the field of Business have already been operating under the mindfulness that consumers do not always engage in sustainable lifestyles purely for eco-centric motivations. Consumers may buy green goods and act sustainably, but do not always care

about the environment (18,19). However, as discussed in Salzmann et al., unlike the research in the fields of Environmental Psychology and Environmental Policymaking, business studies often lack quality and quantity of empirical data (20).

### Hypothesis

Thanks to empirical data from Environmental Psychology and Environmental Policymaking, it is common knowledge that measures such as political ideology, worldview, age, gender and income can help predict environmental behavior. The Literature Review section of this paper will describe these studies. The purpose of this research will be to find relationships between these measures and correspondents' self-reported likelihood to engage in sustainable lifestyle behaviors. The findings of this research will then be compared against the previous studies on environmental behavior. This study will hopefully lay the foundations for interdisciplinary discussion and research on the topic of sustainable behaviors. I hypothesize that ones' political ideology, worldviews, and other measures can be used to predict sustainable lifestyle behaviors in a similar – yet not exact – manner as they do environmental behaviors. If this hypothesis proves true, policymakers, businessmen, and activists alike will be one step further towards understanding the barriers that stand in the way of a sustainable future.

## Literature Review

### An Overview

As was indicated in the previous section, this study draws on the conclusions of previous studies in the fields of Environmental Policymaking, Environmental Psychology, Business and Economics. Specifically, some measures that have been linked to environmental behavior will be utilized to predict sustainable lifestyle behaviors. The findings will then be contrasted, and the discussion section will tie-in the research in the fields of Business and Economics. The Literature Review section will therefore condense findings of Environmental Psychology and Policymaking that are directly used in this study, findings of Environmental Policymaking and Psychology that are not directly used in this study yet still provide important theoretical framework, and a section on the findings of Business and Economics pertaining to sustainable behaviors.

### Measures Used in This Study: Political Ideology

As stated in Zelezny et al. in 2000, “One of the ways psychologists can promote environmentalism is to understand the relationship between the demographic variables and environmental attitudes and behaviors and the implications these human-environment relationships may have on theory, social action, and policy (21).”

The first of these variable measures is Political Ideology. As said by Jost et al., in 2009, “Political ideology provides a shared belief and value system through which people view

and react to the world around them (22).” Political Ideology helps shape how people think, value the environment, analyze risk, and proscribe solutions (22). For example, it has been found that liberals are more open towards change, work towards equality, and are less worried about keeping to tradition when compared to conservatives (22). As well, Liberals tend to be more willing to balance the risk of uncertainty with the possibility of changing the social regime to fix inequality and other problems (22).

Figure 2, below, depicts the factors that might lead one to consider oneself conservative or liberal. Epistemic motives are associated with “the drive to reduce uncertainty, complexity, or ambiguity” and lead to “cognitive preference for certainty, structure, order and/or closure (22). Having a high level of epistemic motivation relates to a more conservative ideology (22).

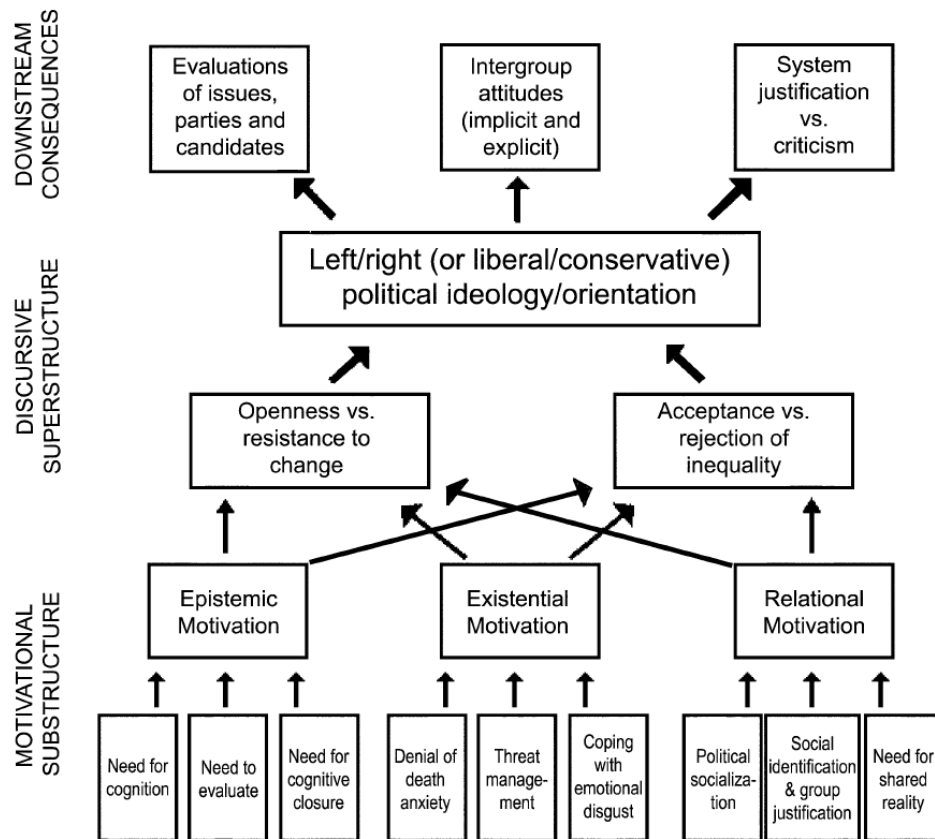


Figure 2. Jost's Motivaitonal, Discursive, and Down stream Consequences Structure of Political Ideology

Source: Jost, John T., Christopher M. Federico, and Jaime L. Napier. "Political ideology: Its structure, functions, and elective affinities." *Annual review of psychology* 60 (2009): 307-337.

As a result of all these factors, when Environmental Psychologists and Policymakers measure political ideology on a single-item spectrum of liberalism-conservatism, where the respondents self-report their perceived location on the liberal-conservative scale, studies have found that there are “significant relationships between political ideology and environmental attitudes (23, 24).” Studies show that liberals show greater concern for the environment, are more likely to be in favor of environmental policies, and engage in

environmentally friendly behavior more often than their conservative counterparts (25 – 31). Therefore, the application of this measure will likely be a useful when studying sustainable lifestyle behaviors.

Beyond the relationship between ideology and environmental behavior, studies have also shown that Republicans and conservatives fear the negative effects of climate change less than Democrats and Liberals (32-35) and are more likely to deny that anthropogenic factors are any major driving force for the changing climate (36). Epistemic factors, or “drives to reduce uncertainty, complexity or ambiguity; cognitive preference for certainty, structure, order, and/or closure (22),” have been theorized to explain these results. Studies theorize that because climate change imposes ideas of uncertainty and threat toward the social system of conservatives, and because conservatives are highly likely to have epistemic motivations as a part of the way they operate, it is logical to see the threat that the existence of climate change inflicts on their current system of social order (22, 37). Though this study does not directly study epistemic factors, in future studies, it will be interesting to see how they interact with sustainable lifestyle behaviors, since sustainable lifestyle behaviors do not typically have the same level of system-level uncertainty and threat associated with them as environmental behavioral changes do.

In recent literature, there has been work that closely links sustainable lifestyle behaviors to political ideology. Gromet’s 2013 research ties political ideology to energy efficiency attitudes. Though energy efficiency is not precisely sustainability, there are strong ties

between the topics, and this study serves as a fresh perspective of a topic that includes research on a topic other than environmental behaviors. The findings of Gromet's study show that the more conservative a respondent was, the less likely he/she favored energy-efficient technologies (38). The results of this study can be found below in Table 1. It is reasonable to expect that the findings in this study will be comparable to this study's research.

Predictor variables	Favor investment	Standard error	Carbon emission reduction	Standard error	Foreign oil reduction	Standard error	Cost reduction	Standard error
Ideology composite	-0.24***	(0.03)	-0.39***	(0.03)	-0.10***	(0.03)	-0.14***	(0.03)
Age	0.004	(0.003)	0.01*	(0.004)	0.01***	(0.003)	0.01**	(0.003)
Sex (male = 0; female = 1)	0.13	(0.09)	0.36*	(0.10)	0.10	(0.08)	0.19*	(0.08)
Education level	-0.02	(0.03)	-0.05	(0.04)	-0.03	(0.03)	-0.06	(0.03)
Income level	0.06	(0.05)	0.01	(0.06)	0.04	(0.05)	0.01	(0.05)
Constant	5.49***	(0.22)	5.23***	(0.25)	5.31***	(0.21)	5.56***	(0.20)

Unstandardized regression coefficients (with SE in parentheses) are reported. Ideology composite: Higher numbers indicate greater conservatism. Note: 31 participants were excluded from these analyses because they did not provide their income level (remaining  $n = 626$ ). The results do not differ if these participants are included in the analyses.

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

**Table 1. Linear regressions predicting how much participants favored investment in energy-efficient technology and how much they valued three features of energy efficiency (reduced carbon emissions, foreign oil dependence, and energy costs) from the political ideology composite (centered:  $M = 3.76$ ,  $SD = 1.42$ ) and demographic controls**

Gromet, Dena M., Howard Kunreuther, and Richard P. Larrick. "Political ideology affects energy-efficiency attitudes and choices." *Proceedings of the National Academy of Sciences* 110.23 (2013): 9314-9319.

### Measures Used in This Study: Cultural Theory

As stated previously, there are "significant relationships between political ideology and environmental attitudes" when respondents report on a one dimensional, conservative to liberal scale (23,24). This one dimensional scale is somewhat generalized and simplifies a series several of heuristics that are undergone while considering a topic such as 'whether or not one would support policy on climate change.' Research indicates that specific measures of ideology are better than the general political ideology measures, assuming

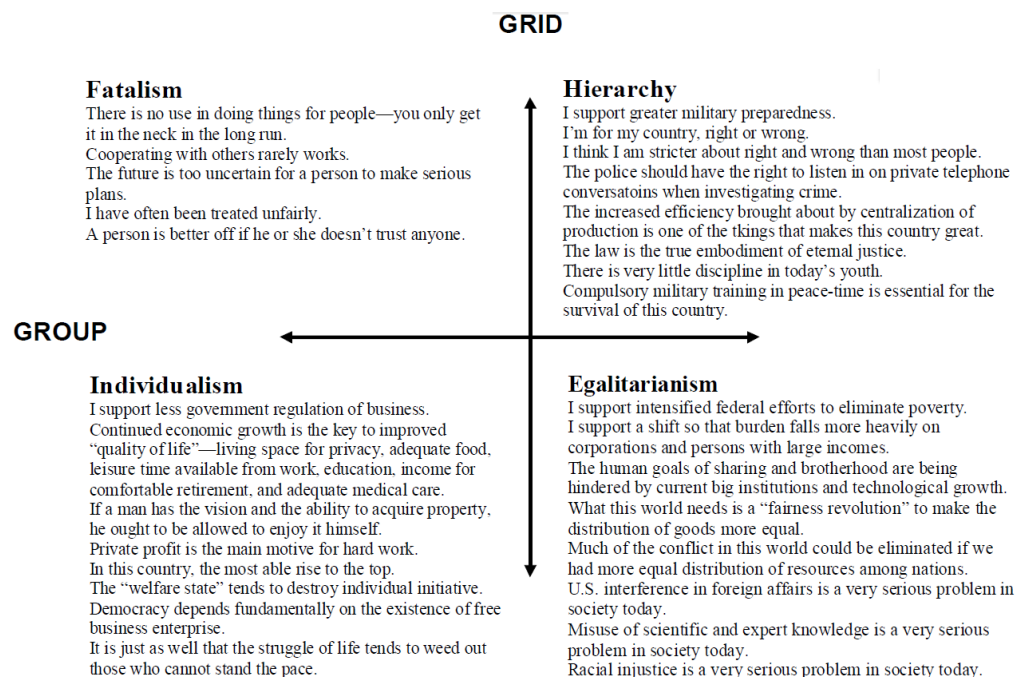
one wants to predict environmental behavior (39,40). Do citizens consciously think about political ideology while considering whether or not to favor an action? Kahan argues that they do not. As said in his 2007 paper on Cultural Cognition and Public Policy, “Cultural commitments operate as a kind of heuristic in the rational processing of information on public policy matters. Again, citizens aren’t in a position to figure out through personal investigation whether the death penalty deters violence, gun control undermines public safety, commerce threatens the environment, et cetera. They have to take the word of those whom they trust on issues of what sorts of empirical claims, and what sorts of data supporting such claims, are credible. The people they trust, naturally, are the ones who share their values—and who as a result of this same dynamic and others are predisposed to a particular view. As a result, even citizens who earnestly consider empirical policy issues in an open-minded and wholly instrumental way will align themselves into warring cultural factions (41).”

When people answer surveys, they actually are answering in alignment to how they view and understand or ‘cognate’ the world. This cognition is central to their identity. For example, the fact that white males answer similarly is linked to the fact that they tend to share similar cultural identities, not because they are somehow different than females by nature (42). As consequence of this logic, research in cultural theory developed. This cultural identity is discussed in the Cultural Theory of Risk Perception where, as stated



by Kahan, “Perceptions of risk reflect and reinforce their commitments to visions of how society should be organized (42).”

Leading scholars of 1990s cultural theory were Drake and Wildavsky. The cultural sectors of Drake’s grid fell into the quadrants of Fatalism, Hierarchy, Individualism, and Egalitarianism. Through these scales, Drake and Wildavsky measured attitudes and risk perceptions on several topics, including gun control, environmental policy, etc. (43- 46). A figure including the types of questions used by Drake can be seen below.



**Figure 3: Drake's Cultural Theory Grid**  
Source: Kahan, Dan M. "Cultural cognition as a conception of the cultural theory of risk." *Handbook of Risk Theory*. Springer Netherlands, 2012. 725-759.

There have been several defining problems with Drake's cultural theory grid, however. Not only did Drake fail to report how reliable the measures were (47), the worldview questions (as seen in Figure 3) have been found to have poor Chronbach's alpha scores and low internal validity (48-50). As indicated by Kahan, because Drake's scale measured separate worldviews with no particular "internal consistency," it was possible to find respondents with high scores in theoretically conflicting measures (47, 50). This indicates that the Drake's questions and Drake's grid itself may be flawed.

In attempt to address these problems, in conjunction with the Cultural Cognition Project at Yale Law School, Kahan has developed his own cultural theory grid, as seen below.

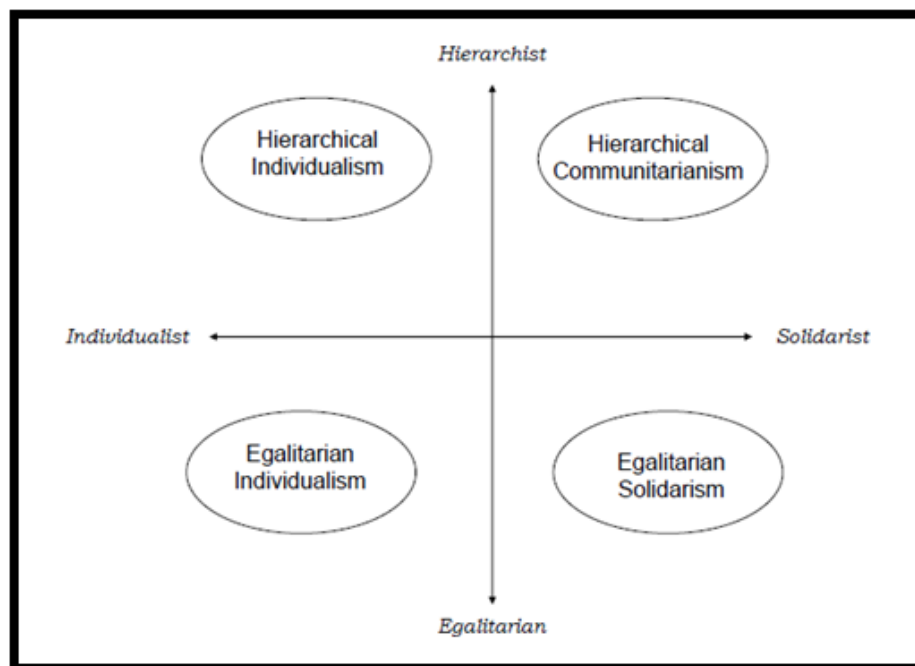


Figure 4: Kahan's Cultural Theory Grid

Source: Kahan, Dan M. "Cultural cognition as a conception of the cultural theory of risk." *Handbook of Risk Theory*. Springer Netherlands, 2012. 725-759.

The first scale of Kahan's grid is hierarchy to egalitarian (HE). This scale indicates a person's 'grid' lifestyle tendency (42, 47). In other words, the HE scale reflects heuristics on how to interpret one's role in society (42, 51). The individual to communitarian (solidarist) (IC) scale indicates heuristics on 'group' thinking and whether or not the collective group is perceived as necessary in order to advance one's own well-being (42, 47, 51).

This Kahan cultural cognition grid has been extremely useful for explaining environmental behavior and attitudes. Respondents described as egalitarian or communitarian will likely think climate change is a high risk and are likely to support pro-environmental behaviors and policies (42, 44, 47). From the egalitarian-communitarian perspective, climate change threatens the community and we all have a responsibility to do something about it. Because environmental degradation can lead to (and are products of) social inequality, pro-environmental behaviors and policies are legitimized (52). Those with hierarchical and individualistic (HI) worldviews have opposing thoughts on the matter. The more HI one is, the less dangerous environmental problems are perceived (42). Individualists typically believe that humans can overcome environmental problems through things such as market solutions, for example (52). In general, hierarchists feel as if climate change poses a risk to current social order. This will be mentioned in the section on System Justification Theory (52).

In some of Kahan's studies, Kahan found that the cultural cognition scale was better at predicting environmental risk perception than characteristics such as gender, age, income, education and ideology (42). Since Kahan's grid has already been used to predict a wide variety of factors, such as environmental risk perception, gun control support, opinions on abortion, etc., this grid should be applicable to sustainable behaviors as well.

However, sustainable lifestyle behaviors are not as politicized as things like gun control and abortion, which are the typical subjects of cultural theory analysis. Therefore, I predict that cultural cognition theory will not have as much predictive ability in this study's findings.

#### Measures Used in This Study: Age

As stated by Stern, age was considered one of the strongest predictors of environmental behavior for a long time (27). By large majority, most studies found that age is negatively correlated with environmental concern (31). The age group ranging from 20 to 24 is the most likely to vote for political measures that sacrifice economic growth to aid the environment (53). However, those in their early 40's are more likely to be actively involved in environmental organizations (53). Researchers theorize that this as a result of the fact that the young are less likely to have been fully integrated into the American economic system (54). As said by Hornback in 1974, "Since solutions to environmental problems are viewed as threatening the existing social order, possibly requiring substantial changes in traditional values habitual behaviors, and existing institutions, it is

logical to expect youth to support environmental reform and accept pro-environmental ideologies more readily than their elders (55).” This ties in well with the previous discussion on the influence of epistemic factors on environmental behavior. However, in reference to this paper’s research, sustainable lifestyle behaviors typically are perceived as less threatening to lifestyles than environmental behavior. Thus, I expect the corresponding results to diverge from the typical environmental behavioral age research.

#### Measures Used in This Study: Gender

There has been abundant evidence pointing to the correlation between gender and environmental concern. Consistent among age groups and geographic locations, women are more likely to be involved in environmental behaviors than men (21,56). As reported by Zelezny in 2000, meta-analytic techniques indicated a relationship of  $r = .10$  between gender and pro-environmental behavior (21). The results of one of Zelezny’s studies can be found as Table B of the appendix. The constructs of empathy and altruism has been shown to be higher in women than men, which partially explain this gender difference (21, 27). In other words, theoretically, because women have more total “ethical care” and concerns about the world than men do, they typically are more willing to be involved in pro-environmental behavior (21, 27). The relationship between gender and sustainable lifestyle behaviors in this study, however, will likely differ from the research in environmental behaviors. Although one *can* get involved in sustainable lifestyle behaviors in order to help the environment as guided by empathy, sustainable lifestyle

behaviors do not have to be and are not always linked to the environment. Thus, I foresee a weaker link between gender and sustainable lifestyle behavior than gender has with environmental behavior.

#### Measures Used in This Study: Income

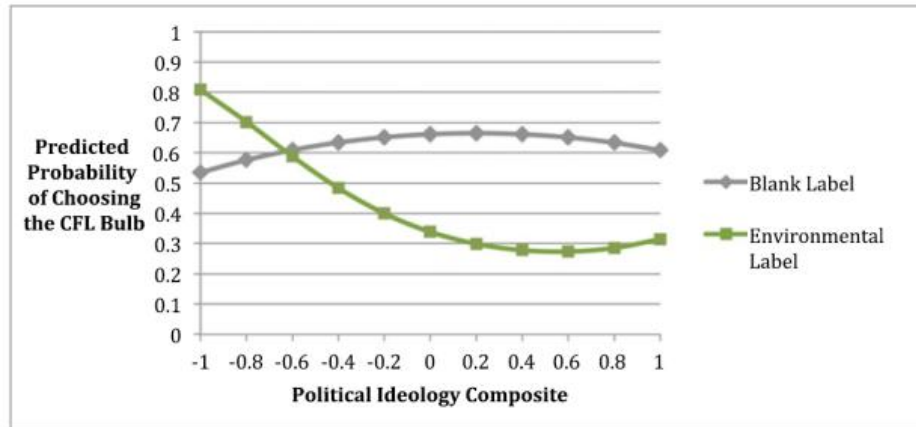
As for income, it has been shown that those of a higher socioeconomic class have lower risk perceptions concerning to the environment (57). At the same time, it has also been noted that those with disposable incomes sometimes are freer to support climate policy (58). It is logical to conclude that those with more money have more funds that can be diverted to non-essential programs, such pro-environmental behaviors. The concept of balancing fiscal performance and environmental performance is a major part of study in the field of Business and will be discussed later.

Just as people in higher socio-economic classes are freer to support environmental policy and engage in environmental behavior, due to the similarities between the two types of behaviors, it is reasonable to theorize that those with a higher income will also be more inclined to have a sustainable lifestyle.

#### Relevant Research: Environmental Stigma

As seen in previous sections, those with conservative ideology typically are against environmentally themed behaviors and policies. As a result, whenever politicians or the

media frame a behavior or policy as environmental, the behavior becomes stigmatized (18, 38). Gromet's 2013 research is applicable to this concept and to this paper's research. In a study, confederates offered participants a choice of two light bulbs. One light bulb was energy efficient, while the other was not. With no other information presented, over 60% of the conservative participants chose the energy efficient CFL light bulb. If the researchers repeated this experiment and added an 'environmentally friendly' label to the CFL, the likelihood of conservatives to choose the CFL dropped to under 40% (see Figure 5). This study can be directly linked to environmental stigma (38). Norms relating to the environment were activated, and conservatives made their decisions based on ideological notions (38). This study is applicable to this paper's research and demonstrates the value in eliminating the term 'environment' for studies researching behaviors where respondent motivations may be only partially related to the desire to help the environment. Though some (liberals) may have ecocentric motivations that lead to the purchase of CFLs, for example, most conservatives do not (38). The purchase of a CFL can indicate a sustainable lifestyle. If a study researching sustainable lifestyle behaviors frames questions around the topic of the environment, the question may stigmatize the behavior and turn away conservatives from actually reporting what they would do, assuming they were not thinking about the environment at that time.



**Figure 5:** Gromet's Lightbulb Study  
Source: Gromet, Dena M., Howard Kunreuther, and Richard P. Larrick. "Political ideology affects energy-efficiency attitudes and choices." *Proceedings of the National Academy of Sciences* 110.23 (2013)

### Relevant Research: Saliency

Overall, most Americans *are* aware of climate change's existence and *do* believe that it is real (3). This being said, such acknowledgement of climate change does not always translate into prevention or adaption policies. Climate change has been becoming less and less of a salient and important issue to Americans as time goes on. (60). However, other factors such as poverty are seen as more important and salient in the eyes of the public (60, 61). Because motivators for sustainable behavior can include concern for the environment *and* other salient factors such as concern for the economy, I feel if the issue is framed correctly, issues linked to sustainability would be more salient than issues linked to the environment.



### Relevant Research: Risk Perception

Risk perception is to be defined as the *perceived* likelihood of negative consequences to oneself and society from climate change (57). Theoretically, risk *should* be conceived as the actual probability of harm times the actual consequences. However, lay interpretation of risk, especially if knowledge on the matter is limited, often differs from professional opinion (62). Experts use mathematical and probability models, while the public generally uses intuition (63). Because the public does not usually use comprehensive risk assessment models, their judgment is subject to fear, bias, and discounting (3). When evaluating a situation, people consider the probability or likelihood of harm, severity and magnitude of harm, immediate versus chronic nature of the harm, reversibility of the harm, if the harm is voluntary or involuntary, and the certainty of harm happening (62). The higher the probability, the more immediate, the more severe, widespread and irreversible, and the more uncertain and lesser-known dangers will have a bigger risk factor in the eyes of the public (62). Climate change is long term and involuntary, thus suggesting that climate change should have high associated risk perception. However, depending on who in the general public you ask, climate change may or may not be seen as severe, reversible, or certain.

There have been several studies pertaining to this topic. For example, Leiserowitz, in his 2005 research, set out to determine if American perceptions on risk could influence attitudes on climate change. This study implemented public risk perception measures and

affective imagery analysis via a “sixteen-page mail-out mail-back survey of a representative sample.” Ultimately, Leiserowitz found that, while Americans are aware of climate change, Americans didn’t consider it an imminent threat, nor did they think it would impact them locally (3).

Motivating factors for engaging in sustainable lifestyle activities should theoretically behave differently than risk relating *only* to environmental consequences because sustainable behaviors can affect the economy, society, *and* the environment. Future studies will hopefully provide empirical data in the field of risk perception and sustainable behaviors.

#### Relevant Research: Knowledge/Beliefs

According to O’Connor, “knowledge about the causes of the global warming is a powerful predictor of behavioral intentions, independent from believing that climate change will happen and have bad consequences (57).” The link between knowledge and risk perception has already been made in the previous section. In regards to sustainable lifestyles, knowledge about sustainability may be a useful measure to predict sustainable behavior. To benefit from knowledge on sustainability, one must first have the wider perspective of how ones’ actions affect society, the economy, and the environment, and one must also have knowledge on what behaviors can be taken to benefit the three areas. If one does not know how to live sustainably, there theoretically is a lower probability

that one will be engaging in such behaviors. Future research is needed to test this hypothesis. As a note, knowledge is highly linked to beliefs. A belief can be described as a proposition or a premise held to be true (57, 64). Beliefs go one step further than knowledge, since one does not have to believe a statement is true in order to be considered knowledgeable.

#### Relevant Research: Values

Values can be described as general preferences that guide action. They serve as goals and underline more specific actions. Values can also be described as enduring beliefs that a specific mode of conduct or end state of existence is personally or socially preferable to and opposite end state (see 65-71). The main value orientation clusters used as predictors for environmental behavior have typically been those of altruism, self-interest, traditionalism, and openness to change (27, 65). Typically, those who have high altruism or high openness to change are more likely to be involved in environmentalism (72-74). Some values lay the foundations for how one views the world, they are likely to play a role in explaining why one may be involved in sustainable lifestyle behaviors. However, further research would be needed to confirm this link.

#### Relevant Research: Attitudes

Attitudes are positive or negative evaluations toward objects of behaviors based on beliefs about them (75). As stated by Ajzen, "It is usually considered to be logical or

consistent for a person who holds favorable attitude toward some object to perform favorable actions, and not to perform unfavorable behaviors, with respect to the object. Similarly, a person with an unfavorable attitude is expected to perform unfavorable behaviors, but not to perform favorable behaviors (76).” To summate a significant amount of research on the matter, findings have shown that attitudes may indicate theoretical preferences and opinions on certain behaviors, but are not good at predicting whether or not a subject *actually* will behave in a certain way (76). If researchers apply the theories of attitudes and behavioral intentions to sustainable behaviors, I foresee that similar conclusions will be made. In fact, studies in business have already noticed that peoples’ attitudes on sustainability do not always match up with actions (see 77).

#### Relevant Research: Norms

Norms are rules of behavior that specify “appropriate and inappropriate thoughts or cognitions feelings or emotions and muscular actions which are established and maintained by members of a group (78).” To help explain why attitudes do not always reflect the prediction of behaviors, Schwartz developed the Normative Based Decision Model which indicated that environmental norms must first be activated in order to affect behavior, and that norms are activated once people are made aware that their actions fall under one of their perceived social norm categories (79-82). If the logic from the norm studies on environmental behavior can be applied to sustainable behavior, norms should undoubtedly influence sustainable behavior correspondingly. If a respondent believes that

sustainable lifestyle behaviors are the societal norm, and if the respondent remembers that he/she believes this (as a result of norm activation), then it is likely that they would be more likely to engage in that sustainable lifestyle behavior.

#### Relevant Research: Systems Justification Theory

People typically prefer stability, credibility, reassurance, and a sense of connectivity within other members of ones' social system (37, 83). If something threatens this sense of security and 'societal status quo,' one option is to cling to beliefs that justifiably deny the existence of the threat (34). This has been cited as one of the explanations for why conservatives, or people with high epistemic motivators, and people who can be noted as hierarchal, are against pro-environmental behaviors (34). The following figure summates some of the research done by Feygina et al., on the topic. This theory can help explain reasoning behind environmental stigma.

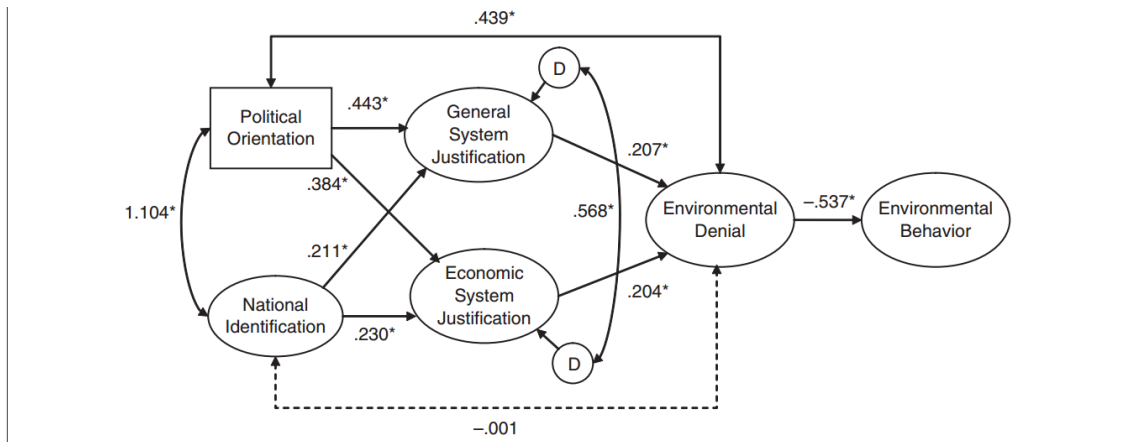


Figure 6: Systems Justification Theory

Source: Feygina, Irina, John T. Jost, and Rachel E. Goldsmith. "System justification, the denial of global warming, and the possibility of "system-sanctioned change"." *Personality and Social Psychology Bulletin* 36.3 (2010): 326-338.

## Relevant Research in Business

Older research in the field of Business studies can be divided into two fields: theoretical and empirical. Past opinions on sustainability have also been divided as well.

Nonetheless, all older research typically tried to explain the relationship between sustainability and financial performance (20). For the business case for sustainability to be made, a company must balance financial performance (FS) and environmental-social performance (ESP) (20).

The following studies describe the past theories on FS and ESP. Empirical evidence in research on Trade-off hypothesis by Vance in 1975, which is based on Friedman's neoclassical argument that a business is only socially responsible for its own well-being, infers that ESP lowers FP (20, 84, 85). Empirical evidence in research on the social

impact hypothesis –which was posed by Cornell and Sharpiro in 1987 – found in Pava and Krausz’s 1996 study and in Preston and O’Brannon’s 1997 study, shows that ESP leads to higher FP (20, 86, 87). The idea of this hypothesis is that when a company alleviates social fears of stakeholders as a service, FP will increase (88). Empirical evidence in research on slack resources theory – which was posed by Waddock and Graves in 1997 – conducted by McGuire et al. in 1998 and Kraft and Hage in 1990, shows that FP leads to ESP (20, 89, 90). The idea of this hypothesis is that when companies are well-off financially, it is easier for them to invest in ESP (91). In addition, Waddock and Graves theorized that once companies are in a position to invest in ESP, there is positive synergy with further FP development and a ‘virtuous circle’ is created (91). This notion has been empirically supported by Preston and O’Bannon in 1997, Pava and Krausz in 1996, and Stanwick and Stanwick in 1998. (86, 87, 92, 93).

The tone of recent research linking to sustainability in business has changed drastically past the turn of the century. Newer papers either focus on consumer attitudes, perceptions and preferences (see 9, 77, 94 - 97), marketing strategy in relations to sustainability (see 19, 98), information on the business case for natural capital (see 6, 99, 100), or papers based on CSR experiences learned from the Triple Bottom Line approach and business opportunities relating to the Triple Bottom Line (see 5, 6, 13, 95, 96, 101-107). The figure seen below, retrieved from work published by OSU’s own Joseph Fiksel of the

OSU Center for Resilience gives a good representation on the type of theory recent papers in Business have published on the topic of Sustainability (108).

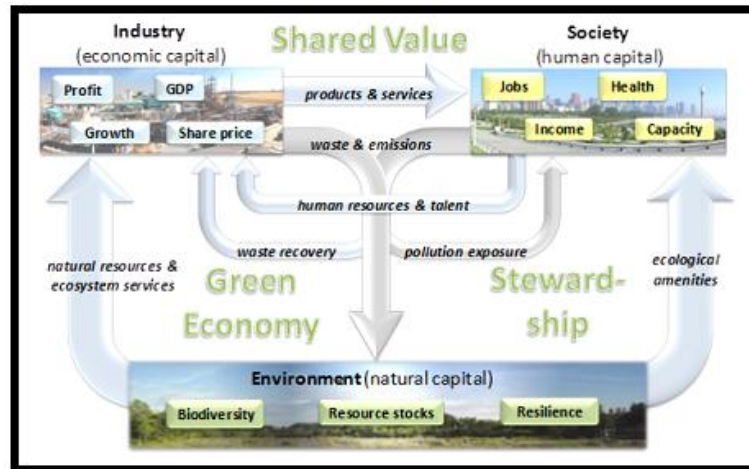


Figure 7: Shared Value

Source: Fiksel, Joseph. "A framework for sustainable materials management." *JOM* 58.8 (2006): 15-22.

As indicated previously, leaders in the field of Business have already recognized the need for caution when using the word ‘environment’ while marketing products (18). Some businesses have made the common mistake of using terminology such as ‘green products’ and ‘environmentally friendly’ while marketing, and then stigmatized a portion of the market (18). As stated in Ottman’s paper on green marketing myopia, “Researchers indicate that many green products have failed because of green marketing myopia – marketers’ myopic focus on their products’ “greenness” over the broader expectations of consumers or other market players, such as regulators or activists (18).” If a business hopes to avoid a ‘marketing myopia,’ the business must, first and foremost, focus on the customer and *then* should focus on the product (109). Findings have shown that successes



in the markets of organic foods and energy-efficient appliances are primarily linked *not* with environmental reasoning, but to consumer values on perceived safety and money savings (19). When ‘connecting green products with desired consumer value,’ Ottman suggested focusing on the following: efficiency and cost effectiveness, health and safety, performance, symbolism, convenience, and bundling (See Table C in the Appendix) (18). This type of information is extremely relevant to research in the fields of Environmental Psychology and Policymaking. More cross-discipline analyses should address the similarities of these findings.

#### Relevant Research in Economics

Studies in economics that relate to environmental or sustainable behavior typically revolve around topics such as supply and demand, green market barriers, cap and trade, and economic fixes to the environment (9), discounting (110), the effect of prices on the energy market (111, 112), and externalities, marginal costs, effects of incentives, and effects of governmental intervention (113). These concepts hardly appear to be mentioned in other fields, which seems surprising. Again, cross-disciplinary research may prove valuable.

## Methodology

This research is based off of questions found in Ajay Singh's PhD survey. In this survey, 763 people participated, while only 653 completed the whole survey in entirety. The average age was 43. 320 of the participants were male, and 315 were female. Some chose not to identify. The survey was given to a random sample of people via an online panel, open for around a week. Because the survey was administered online, there are no response rate statistics. Average age was 43. 72.4% identified as white. 14.2% identified as African American. 10.9% identified as Hispanic/Latino. 6% identified as Asian. 2% identified as Native American. 0.5% identified as Pacific Islander. 0.5% identified as other.

It is not unusual to find similar studies using the survey method. Leiserowitz, for example, conducted a mail-in mail-back survey (3). Krosnick's performed a phone-interview survey (114). Respondents were asked to give a self-reported likelihood from very unlikely to very likely, on a scale of one through five, five meaning very likely, that they would engage in particular sustainable lifestyle behaviors. All of the following questions generally can be said to influence the environment, society, and economy. However, no one question was specifically linked to the environment. It is challenging describing what a sustainable lifestyle actually is, thus leaving the matter open for interpretation.

Question 1: What is your likelihood to choose a car that gets good gas mileage (this would reduce the purchase of trucks, vans, and SUVs)?

Question 2: What your likelihood to install more insulation and weatherize homes and apartments?

Question 3: What is your likelihood to drive less by carpooling, taking trains or busses, walking or riding a bicycle?

Question 4: What is your likelihood to replace older appliances with newer energy efficient models?

Question 5: What is your likelihood to use less air conditioning in the summer and less heat in the winter?

The average reported response of these five questions for each respondent can be considered ones' likelihood to, in general, have a sustainable lifestyle. Using Chronbach's Alpha, the reliability statistic for these five items was .781, indicating that these questions have internal validity and are measuring the same thing. Even though this study did not measure actual behavior, the practice of using "behavioraloid," self-reported measures has been an acceptable practice in the fields of Environmental Psychology (76).

Each of the reported likelihoods to engage in each specific sustainable lifestyle behavior was then compared with measures that typically are used to predict environmental behaviors. These measures were that of age, income, gender, ideology, and worldviews.

Political ideology was divided into self-reported ‘general’ ideology, ‘social’ ideology, and ‘economic’ ideology. Each respondent was gauged on a scale, ranging from one to six, six indicating that the person considered themselves very conservatively oriented.

For the worldviews of Cultural Theory, refer to Table 5. These cultural cognition questions are well-known and have been used in multiple other surveys, including Kahan’s (117, 118). They primarily use a Likert Scale, which asks respondents to rate how much they agree or disagree with a statement or question.

Pearson Correlation was then used to find correlation between each measure and each self-reported sustainable lifestyle behavior.

## Results

The results of this research can be seen i Table 4 on the following page.

Measure	Question Question #	Likelihood to choose a car that gets good gas mileage (this would reduce the purchase of trucks, vans, and SUVs) Question 1	Likelihood to install more insulation and weatherize homes and apartments Question 2	Likelihood to drive less by carpooling, taking trains or buses, walking or riding a bicycle Question 3	Likelihood to replace older appliances with newer energy efficient models Question 4	Likelihood to use less air conditioning in the summer and less heat in the winter Question 5	Average of Questions Average of Questions
Individualistic	Pearson Correlation	0.007	0.099*	-0.063	0.038	-0.056	-0.001
	Adjusted R Squared	-0.001	0.008	0.002	0	0.002	-0.002
	Standard Error of the Estimate	0.995	0.856	1.14	0.924	1.069	0.726
Communitarian	Pearson Correlation	0.156**	-0.003	0.209**	0.093*	0.178**	0.183**
	Adjusted R Squared	0.023	-0.002	0.042	0.007	0.03	0.032
	Standard Error of the Estimate	0.983	0.86	1.117	0.921	1.054	0.71378
Hierarical	Pearson Correlation	0.046	0.048	0.024	0.06	0.065	0.066
	Adjusted R Squared	0.001	0.001	-0.001	0.002	0.003	0.003
	Standard Error of the Estimate	0.994	0.859	1.142	0.923	1.069	0.72441
Egalitarian	Pearson Correlation	0.166**	0.119**	0.318**	0.186**	0.204**	0.281**
	Adjusted R Squared	0.026	0.013	0.1	0.033	0.04	0.078
	Standard Error of the Estimate	0.981	0.854	1.083	0.909	1.048	0.69675
Egalitarian/ Communitarian	Pearson Correlation	0.19**	0.062	0.306**	0.16**	0.224**	0.269**
	Adjusted R Squared	0.035	0.002	0.092	0.024	0.049	0.071
	Standard Error of the Estimate	0.977	0.859	1.088	0.913	1.044	0.69925
Hierarical/ Individualistic	Pearson Correlation	0.034	0.088*	-0.21	0.06	0.009	0.042
	Adjusted R Squared	0	0.006	-0.001	0.002	-0.001	0
	Standard Error of the Estimate	0.995	0.857	1.142	0.923	1.071	0.72537
Gender	Pearson Correlation	-0.012	-0.053	-0.007	-0.056	-0.034	-0.043
	Adjusted R Squared	-0.001	0.001	-0.002	0.002	0	0
	Standard Error of the Estimate	0.995	0.854	1.141	0.918	1.072	0.72169
Income	Pearson Correlation	0.041	0.031	-0.082*	0.078*	0.043	0.025
	Adjusted R Squared	0	-0.001	0.005	0.005	0	-0.001
	Standard Error of the Estimate	0.994	0.859	1.138	0.922	1.071	0.72525
Age	Pearson Correlation	-0.093	-0.109*	-0.067	-0.089	-0.113*	-0.13**
	Adjusted R Squared	0.006	0.01	0.002	0.006	0.11	0.015
	Standard Error of the Estimate	0.998	0.901	1.153	0.939	1.092	0.72837
General Ideology	Pearson Correlation	-0.043	0.012	-0.16**	-0.1*	-0.141**	-0.126**
	Adjusted R Squared	0	-0.001	0.024	0.008	0.018	0.014
	Standard Error of the Estimate	0.991	0.864	1.133	0.924	1.069	0.72438
Social Ideology	Pearson Correlation	-0.109**	-0.011	-0.177**	-0.142**	-0.145**	-0.167**
	Adjusted R Squared	0.01	-0.001	0.03	0.019	0.019	0.026
	Standard Error of the Estimate	0.989	0.862	1.125	0.918	1.059	0.71754
Economic Ideology	Pearson Correlation	-0.105**	-0.009	-0.169**	-0.126**	-0.109**	-0.148**
	Adjusted R Squared	0.01	-0.001	0.027	0.014	0.01	0.02
	Standard Error of the Estimate	0.986	0.863	1.129	0.921	1.066	0.72223

Table 4: Results

\*. Correlation is significant on the 0.05 level (2-tailed)

\*\*. Correlation is significant on the 0.01 level (2-tailed)

## Discussion and Interpretation

The first question that should be asked of this study is “Do these behaviors represent sustainable lifestyles?” I maintain that they do. As stated earlier, it is challenging describing what a sustainable lifestyle actually is, thus leaving the matter open for interpretation. In either case, each of the questions fit the description of ‘being applicable to the environment, economy, and society while not being specifically related to any of the three. Nonetheless, a future study with specific questions that definitely fall within three categories will be of value.

Second, one should ask about the internal validity of the cultural cognition questions. Drake’s old grid was said to have poor validity (47-50). It would be a serious oversight not to ensure that these particular questions didn’t have the same problems. The tests for validity can be seen below in Table 5.

In Table 5, not all of the questions and measures perform well. The Hierarchal questions, specifically, perform the worst. However, when the measures are combined to form a HI and EC index, as seen in Table 5, the Chronbach’s Alpha improved. HI and EC were used as additional measures in order to reflect procedure done in previous studies by

Kahan which have shown that perceptions on the environment are more directly related to those two categories (42, 44, 47).

Question	Principle Component Analysis	Measure	Chronbach's Alpha	Combined Measure	Chronbach's Alpha When Combined
Even if some people are at a disadvantage, it is best for society to let people succeed or fail on their own	0.8	Individualism	0.688	<b>HI</b>	0.713
Even the disadvantaged should have to make their own way in the world	0.604				
We all are better off when we compete as individuals	0.617				
It is not the government's responsibility to try to protect people from themselves	0.534				
Too many people today expect society to do things for them that they should be doing for themselves	0.713				
Our society is in trouble because we don't obey those in authority	0.776	Hierarchal	0.579		
The best way to get ahead in life is to do what you are told to do	0.788				
Society would be better off if we imposed strict punishment on those who break the rules	0.642				
What our society needs is a "fairness revolution" to make the distribution of goods more equal	0.815	Egalitarian	0.632	<b>EC</b>	0.736
Society works better if power is shared equally	0.753				
It is society's responsibility to reduce the gap in the income between the rich and the poor	0.791				
The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals	0.838	Communitarian	0.761		
Government should put limits on the choices individuals make so they don't get in the way of what's good for society	0.838				

Table 5: Cultural Cognition Questions

Third, what do these results mean? To answer this question, I will briefly report my interpretations of the findings in each of the measures.

### Individualism and hierarchal

Other than reporting the higher likelihood that they would insulate and weatherize their homes, people with high individualistic tendencies did not report any significant tendencies towards sustainable behaviors. For the Hierarchy scale, none of the

likelihoods were reported. The combined HI measure also only lists weatherization as likely. These results mirror Kahan's research (52). Why was weatherization reported as likely? Weatherizing ones' home seems like a very individualistic, 'do it yourself' type idea. Perhaps this is why these respondents were slightly more likely to report it.

### Communitarian and Egalitarian

For the most part in the Communitarian, Egalitarian, and EC measures, most of the sustainable lifestyle behaviors were reported as highly likely. The only behavior in the Communitarian and EC measure that didn't report as 'likely' was the weatherization behavior. To clarify, though this question wasn't 'likely,' it was not reported as unlikely. These types of people were just neutral to the idea of the activity and no correlation either way was found. Perhaps this has something to do with the highly individualistic, do-it-yourself nature of home weatherization, as stated earlier. Other than that, there is not enough information to explain why this is the case.

### Gender

In the statistical analysis, when determining gender, 0 meant female and 1 meant male. Thus, the statistics here specifically are in regards to if males were more likely to report likelihood in engaging in these sustainable lifestyle behaviors. Refer to Tables D and E in



the appendix for more information regarding gender. Nonetheless, if these findings were to mirror the studies indicated in the Literature Review section, one would expect to find that males were less likely to report their likelihood in engaging in sustainable lifestyle behaviors. Though there was a negative coefficient associated with each of the behavioral questions, none of the correlations were strong enough to be considered significant. This is a big contrast with the highly predictive nature of the gender measure for environmental behavior in past studies. As I said earlier, I do not think that empathy could should really into play and be an important value that comes to mind while engaging in these sustainable activities. For example, though one can ride their bike instead of driving cars, I doubt empathy would be the value used during the decision process on whether or not one would engage in this behavior.

### Age

As stated previously, past studies have led to the expectation for youth to support environmental reform and accept pro-environmental ideologies more readily than their elders (55). For a long time, this was the longest predictor of environmental behavior (27). Do the findings of this research mirror this trend? Yes and no. For the weatherization and air conditioning question, there was a correlation significant on the .05 level that suggested that as age increased, the willingness to involve in these

behaviors would decrease. I expect that this results from the nature of the behaviors themselves. As one ages, it is more challenging to weatherize ones' home. I also *expect* that older respondents value comfort more than younger respondents, influencing this trend. As a whole, the total measure for all sustainable lifestyle behaviors did show a negative correlation significant on the .01 level. This finding parallels older study results, though is not as significant.

### Income

The median income reported was between 35 through 45 thousand dollars a year. The average reported was between 25 and 35 thousand dollars a year. Income was only significant at the 0.05 level in regards to two questions: questions 3 and 4. Respondents reported that they were less likely to 'drive less by carpooling, taking trains or busses, walking or riding a bicycle' and *more* likely to 'replace older appliances with newer energy efficient models.' When applying information from economics, this makes sense. It is possible that people who have higher paying jobs are often more likely to need to commute longer distances and/or are often less likely to stop driving because of gas prices. As well, the higher the salary, the higher the opportunity cost spent taking something other than the quickest way to get to work (which typically involves driving). Therefore, it is more reasonable to see people with higher income that drive to work than

don't. Environmental values do not necessarily even have to come into the picture.

Similar reasoning can be applied to question 4. People with a higher income have more of a disposable income than those with a lower income and can afford non-essential goods, such as high-tech efficiency products which require a high return on investment payback period (110-113). I am surprised that this measure did not have any significantly correlating relationships with any of the other behaviors, however. For example, I would have anticipated a higher relationship between income and question 5. Typically, people are able to afford keeping the AC or heat on in respective seasons if the budget allows. However, income did not show this relationship and left other measures to predict when one might decrease heating / cooling habits.

### Ideology

Findings on ideology showed a strong correlation with considering oneself as conservative and not reporting likelihood to engage in sustainable lifestyle behaviors. The only behavior conservatives were not *unlikely* to do, was to weatherize their homes. This reflected the cultural theory findings. I was personally surprised with these results. These behaviors are not necessarily linked to environmental values, thus removing the stigma and allowing conservatives to report their un-stigmatized likelihoods. Even though the

stigma should have been removed, the results were parallel to studies on environmental behavior.

#### Other Discussion Topics: Stigmatization

A possible explanation for the ideological results may be that the study was still unintended stigmatized and polarized. The survey was sent out by The School of Environment and Natural Resources. Other questions in the survey other than these talked about the environment. Though these questions did not necessarily have anything to do with the environment, the damage maybe have already been done, so to speak. The environmental stigma may have carried over and affected these results. It would be beneficial for future studies to completely eliminate the usage of the word ‘environment’ if one hopes to obtain accurate findings.

#### Other Discussion Topics: Ideology versus Cultural Cognition

I would like to point out the fact that the ideology measures were weaker than the Cultural Cognition worldview measures. Even though some of the Cultural Cognition questions were not the best, there consistently were higher Pearson Correlation factors while using the Cultural Cognition measures. This finding will hopefully contribute to the Ideology vs. Cultural Cognition debate.

## Recommendations

### New Experiments

We need research experiments, not surveys, involving sustainable lifestyle behaviors that can ensure that the stigma and norm activation related to environmental values and knowledge is not present. This way, the questions do not get stigmatized by previous questions, as they may have in this survey. More experiments like Gromet's 2013 study truly will help the field.

### The Discussion on Framing

As shown previously, in recent decades, ideological and party elites in the United States have become polarized on a wide range of social, economic, and cultural issues—including environmental issues such as climate change (35). Because of this, researchers, politicians, educators, businesses and students alike need to rethink their framing while considering the specific type of behaviors of interest. If there truly is value in the study and promotion of sustainable lifestyle behaviors specifically – as opposed to

environmental and energy reduction behaviors – there should be appropriate framing and wording that is specific to these unique behaviors.

This holds especially true for those who care about climate change. Reducing climate change remains an important issue and behaviors that can be indirectly linked to sustainable lifestyles do have potential opportunities to reduce global carbon emissions (115-116). As stated earlier, some people care about other things, such as safety and money savings, instead of sustainability (19). Mention of the environment may even turn people away (see Literature Review sections on Ideology and Worldviews).

Therefore, it is crucial to frame information so that sustainable lifestyles are not incorrectly associated directly with environmentalism, thus stigmatizing the topic for a large sector of the population.

### Cross-Disciplinary Discussions

The topics of energy, behaviors, economics, psychology, politics and business all are directly linked to one another. Thus, the researchers in each of these fields, especially when it comes to a cross-functional subject such as sustainability, need to break out of their own realms and include theory from one another. If such cooperation existed, the field of Business in particular has great potential to improve its theory. As said in

Salzmann's 2004 paper, in business, past "qualitative studies (case studies in particular) are not representative (and) quantitative studies (typically) yield inconclusive results (20)."

### Conclusions

As has been demonstrated in this paper, sustainable behaviors are different than environmental behaviors. This difference warrants individualized research on each set of behavior. This fact holds especially pertinent for those who consider sustainability a way to improve the economy, society, and environment simultaneously. As was shown in the Literature Review section, past research on environmental behaviors from the fields of Environmental Psychology and Environmental Policymaking have been extremely quantitative and qualitative. Sustainability studies from the Business and Economic disciplines have also added significant contributions to this type of research, though often lacks the quality and quantity of research that is commonplace in Environmental Policymaking and Environmental Psychology. To initiate interdisciplinary discussion, I used measures from past Environmental Policymaking and Environmental Psychology studies, applied them to sustainable lifestyle behaviors instead of environmental behaviors, found that the results mimics, but does not mirror, findings from Environmental Psychology and Environmental Policymaking, and applied concepts from

Business and Economics to help better explain why the findings were different. Though this study was a big step in the right direction for interdisciplinary research, if general academia is to study sustainable lifestyle behaviors, more comprehensive studies are needed. Either way, I hope that these findings contribute in some form, albeit small, to the larger discussion in general academic research.

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## Appendix A

**Table A Significant U.S. Energy Efficiency Policies**

<i>Name</i>	<i>Year</i>	<i>Magnitude</i>
Corporate Average Fuel Economy Standards	1978–	\$10 billion annual incremental cost from tightened 2012 rule (NHTSA 2010)
Federal Hybrid Vehicle Tax Credit	2006–2010	\$426 million total annual credit (Sallee 2010)
Gas guzzler tax	1980–	\$200 million annual revenues (Sallee 2010)
Federal appliance energy efficiency standards	1990–	\$2.9 billion annual incremental cost (Gillingham, Newell, and Palmer 2006)
Residential and commercial building codes	1978–	
Electricity Demand-Side Management programs	1978–	\$3.6 billion annual cost (US EIA 2010)
Weatherization Assistance Program (WAP)	1976–	\$250 million annual cost (US DOE 2011a)
2009 Economic Stimulus	2009–2011	\$17 billion total (U.S. DOE 2011b)
Additional WAP funding		\$5 billion
Recovery Through Retrofit		\$454 million
State Energy Program		\$3.1 billion
Energy Efficiency and Conservation Block Grants		\$3.2 billion
Home Energy Efficiency Tax Credits		\$5.8 billion credit in 2009 (U.S. IRS 2011)
Residential and Commercial Building Initiative		\$346 million
Energy Efficient Appliance Rebate Program		\$300 million
Autos Cash for Clunkers		\$5 billion

Source: Allcott, Hunt, and Michael Greenstone. Is there an energy efficiency gap? No. w17786. National Bureau of Economic Research, 2012.

## Appendix B

**Table B:** Comparison of Girls and Boys on Environmental Attitudes and Behavior, by Year

DV	Girls	Boys	F ratio
	n <sub>1994</sub> = 303 n <sub>1995</sub> = 353	n <sub>1994</sub> = 260 n <sub>1995</sub> = 337	
Q3. Self-rated environmental concern	3.49 <b>3.36</b>	3.27 <b>3.13</b>	7.00** <b>8.81**</b>
Q6. Self-rated personal responsibility to improve the environment	3.34 <b>3.25</b>	3.07 <b>2.91</b>	8.63** <b>17.85**</b>
Q12. Concern about trash	4.11 <b>4.07</b>	3.81 <b>3.76</b>	12.39** <b>14.22**</b>
Q14. Interest in recycling	3.94 <b>3.85</b>	3.72 <b>3.69</b>	8.11** <b>4.47**</b>
Q21. Interest in school recycling	4.21 <b>3.90</b>	3.95 <b>3.61</b>	11.04** <b>14.60**</b>
Q22. Participation in school recycling	3.88 <b>3.31</b>	3.48 <b>2.91</b>	17.25** <b>15.92**</b>
NEP Scale	22.93 <b>22.68</b>	21.94 <b>21.52</b>	8.95** <b>13.46**</b>

Note: 1994 means are the upper values in each cell. 1995 means are the lower values in each cell and are in boldface.

\*  $p < .05$ . \*\*  $p < .01$ .

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## Appendix C

**Table C: Marketing messages connecting green products with desired consumer value**

Value	Message and business/product
Efficiency and cost effectiveness	<p>"The only thing our washer will shrink is your water bill." –ASKO</p> <p>"Did you know that between 80 and 85 percent of the energy used to wash clothes comes from heating the water? Tide Coldwater–The Coolest Way to Clean." –Tide Coldwater Laundry Detergent</p> <p>"mpg:)" –Toyota Prius</p>
Health and safety	<p>"20 years of refusing to farm with toxic pesticides. Stubborn, perhaps. Healthy, most definitely." –Earthbound Farm Organic</p> <p>"Safer for You and the Environment." –Seventh Generation Household Cleaners</p>
Performance	<p>"Environmentally friendly stain removal. It's as simple as H<sub>2</sub>O." –Mohawk EverSet Fibers Carpet</p> <p>"Fueled by light so it runs forever. It's unstoppable. Just like the people who wear it." –Citizen Eco-Drive Sport Watch</p>
Symbolism	<p>"Think is the chair with a brain and a conscience." –Steelcase's Think Chair</p> <p>"Make up your mind, not just your face." –The Body Shop</p>
Convenience	<p>"Long life for hard-to-reach places." –General Electric's CFL Flood Lights</p>
Bundling	<p>"Performance and luxury fueled by innovative technology." –Lexus RX400h Hybrid Sports Utility Vehicle</p>

SOURCE: Compiled by J.A. Ottman, E.R. Stafford, and C.L. Hartman, 2006.

## Appendix Table D

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.012 <sup>a</sup>	.000	-.001	.995

a. Predictors: (Constant), What is your gender?

## Appendix Table E

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Likelihood to choose a car that gets good gas mileage (this would reduce the purchase of trucks, vans, and SUVs)	Equal variances assumed	.020	.887	.305	631	.760	.024	.079	-.131	.179
	Equal variances not assumed			.305	630.009	.760	.024	.079	-.131	.179
Likelihood to install more insulation and weatherize homes and apartments	Equal variances assumed	.651	.420	1.337	631	.182	.091	.068	-.043	.224
	Equal variances not assumed			1.337	630.933	.182	.091	.068	-.043	.224
Likelihood to drive less by car pooling, taking trains or buses, walking, or riding a bicycle	Equal variances assumed	.898	.344	.172	628	.864	.016	.091	-.163	.194
	Equal variances not assumed			.172	627.577	.863	.016	.091	-.163	.194
Likelihood to replace older appliances with newer, more energy efficient models	Equal variances assumed	4.905	.027	1.404	630	.161	.103	.073	-.041	.246
	Equal variances not assumed			1.405	624.649	.161	.103	.073	-.041	.246
Likelihood to use less air conditioning in the summer and less heat in the winter	Equal variances assumed	.351	.554	.862	629	.389	.074	.085	-.094	.241
	Equal variances not assumed			.862	628.996	.389	.074	.085	-.094	.241
Env_BehAvg	Equal variances assumed	1.940	.164	1.083	632	.279	.06207	.05733	-.05050	.17465
	Equal variances not assumed			1.083	628.203	.279	.06207	.05729	-.05043	.17458

## Vitae of Investigators

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### Education

**St. Francis de Sales H.S.** – Toledo Ohio. GPA: 4.667 (4.667 scale)

**Ohio State University**, Columbus Ohio. GPA: **3.94** (4.0 scale)

- Fourth Year student. Graduation Date: Summer 2013.
- Major: Honors Environmental Policy & Management with focus on Sustainability and Business
- Minors: Political Science and Environmental Economics.
- Founding president of student organization – The Intergalactic Science Fiction Club
- Treasurer of Students for a Sustainable Campus.

### Honors and Awards

- Member of Ohio State's Environment and Natural Resources Honors Program
- Newcomb Scholar Award- 2010 through 2013. Given to students within the top 3 GPA of CFAES
- Director's List of High Achievers- Seven quarters
- Member of The National Society of Collegiate Scholars
- Columbus Rotary Scholar

### Work Experience

-Efficiency Smart Benchmarking Coordinator Intern: Current.

- Honda Transmission Manufacturing of America Facility's ES Co-op: Winter semester 2013.

Assist with green building initiatives. Keep up-to-date with MSDS and IMDS work. Implement a employee green awareness and involvement program. Permitting assistance and ISO 14001 recertification work. Environment and Safety related project design and bids to contractors. Potable and industrial water work, air compression leak reduction, etc.

- Honda of America Mfg., N.A. Purchasing's Sustainable Supply Chain Co-op: Summer 2012

Duties: Collect and input supplier tier 1 and 2 Carbon equivalent GHG data. Improve data collection system. Energy audit OEM locations while offering CO2e reduction suggestions, and maintain communication with and among suppliers.

- EA Sports College Representative for Ohio State: 2010-2011 year.

Duties: Promotion of EA games, social networking, event hosting, local networking

- Ohio Citizen Action Canvasser: Summer of 2011

Duties: Door-to-door canvassing of 150 houses on local environmental legislation

- The Andersons: Summer of 2007 (Outdoor nursery attendant and customer assistance)

- Hospital Parking Management: Summer of 2010 (Valet parking)

### Related Course Work and Activities

- Fisher School of Business Sustainability Cluster's Sustainability Certification.

Ongoing class research of sustainable business projects, partnered with Alcoa and Dow

- Certified Net Impact member and have organized and participated in several green programs

- Summer Study Abroad: Sustainable Society and Environment of Australia

- Student Mentor for new major, Environmental Economic Development Sustainability (EEDS)

- Environmental and Sustainability Economics and Cost-Benefit Analysis classes

- Sustainable Supply Chain Logistics Class, with research on lean management.

- Nat. Resources Policy, Enviro Law, Enviro Psychology, and Climate Change courses